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ABSTRACT

This study was designed to better understand the motivational impact of a compulsory Web-based course, "Introduction to Educational Research," on student teachers' enrollment in a four-year teacher education program in a Quebec, Canada university. The hypothesis was that this course, which promoted self-determination, feelings of competence, and affiliation, would have a positive impact on student motivation. Results from quantitative and qualitative data on nine groups of student teachers taking the course indicated that the course had a positive impact on students' motivation to learn. However, the results also suggested that all students may not be ready to handle such autonomy or self-determination, and that the gap between the university classroom and the virtual classroom is substantial and often difficult to bridge. The gap was particularly evident in light of the significant decrease in students' motivation after only 4 weeks of the course. Despite obstacles, the results noted advantages of integrating information and communications technology into teacher education programs (e.g., greater autonomy, more access to information and knowledge, increased motivation to learn, and improved and more frequent communication among educators and learners, among learners themselves, and among educators). (Contains 43 references.) (SM)

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Teaching Educational Research to Student Teachers : The Pros and Cons of Using Information and Communication Technology

Thierry Karsenti, Université de Montreal

Gilles Thibert, Université du Québec à Montréal

ED 482 000

DRAFT

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ABSTRACT

The goal of this research is to better understand the motivational impact of the implementation of a compulsory Web-based course (*Introduction to Educational Research*) on student-teachers enrolled in a four-year teacher education program (n = 429) in a Quebec (Canada) university. Our starting hypothesis was that this course (*Introduction to Educational Research*), with its nature promoting self-determination, feelings of competence and affiliation, would have a positive impact on the motivation of the students. The results presented are drawn from both quantitative and qualitative data analysis.

FOR INFORMATION

Thierry Karsenti, Ph.D.
Associate Professor
Université de Montréal
Faculté des sciences de l'éducation
C.P. 6128, Succursale Centre-ville
Montréal (Québec), H3C 3J7
Tel. : (514) 343-2457
Fax : (514) 343-7660
thierry.karsenti@umontreal.ca

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The goal of this research is to better understand the motivational impact of the implementation of a compulsory Web-based course (*Introduction to Educational Research*)on student-teachers enrolled in a four-year teacher education program (n = 429) in a Quebec (Canada) university. Our starting hypothesis was that this course (*Introduction to Educational Research*), with its nature promoting self-determination, feelings of competence and affiliation, would have a positive impact on the motivation of the students. The results presented are drawn from both quantitative and qualitative data analysis.

INTRODUCTION

In the last fifty years, a large number of changes have wrought havoc on society : the arrival of television, new means of transportation, new information and communication technologies. Coupled with the metamorphosis of family structures and social values, these innovations have had a particular impact on students who have come of age in the midst of these societal transformations and this technological revolution. These new generations have modern needs and expectations which manifest themselves particularly in academic environments such as universities. In fact, at the dawn of the new millennium, higher education faces numerous challenges: the growing diversity of student profiles, the arrival of new technologies, the multiplicity of university programs, as well as the students' lack of motivation. According to Gadbois (1989), "*Of all things that ail society [...] the most important is the lack of interest for any activity that doesn't offer short-term personal profit. This attitude is manifested by a great number of young people in their lack of motivation for schooling and for their no-preparation for an eventual social role.*" (Gadbois, 1989: 32)

Our changing society, now more and more depending, socially and economically upon information and communication technologies (ICTs), is giving rise to new educational needs as well as to new teaching methods. Distance education, in particular the arrival of Web-based courses, presently appears to be one of the great focuses of pedagogical innovation at the university level. Furthermore, as these types of distance courses greatly augment the possibilities of network implementation and of individual or group learning, the most basic learning theories and teaching principles such as those of Thorndike (law of effect and law of exercise), of Dewey (learning through action), of Piaget (construction of knowledge) and of Vygotsky (learning as a socio-interactive process) could be applied more readily and especially more often (see Grégoire, Bracewell and Laferrière, 1996).

In light of the challenges issued from university teaching, particularly those pertaining to the students' motivation to learn and to the development of richer technological environments, it was decided to implement a compulsory, distance, web-based course (*Introduction to Educational Research*) within the teacher training program of a Quebec university. It should be noted that this

was the first compulsory Web-based course in any teacher education program in Canada and that the Quebec university (no matter the program or faculty) had never housed such an experiment in the past.

GOAL

The goal of the present research was to study and better understand the motivational impact of the implementation of a compulsory Web-based - *Introduction to Educational Research* - course in a teacher education program. Our starting hypothesis was that this course, with its nature promoting self-determination, feelings of competence and affiliation (Deci and Ryan, 1991 ; Ryan and Deci, 2000), would have a positive impact on the motivation of the students.

THEORETICAL FRAMEWORK

Motivation

Motivation, a force that energizes and directs behavior toward a goal (Eggen and Kauchak, 1994), could certainly be perceived as one of the most important psychological concepts in education. In fact, according to Meece (1993), current educational problems go beyond declining achievement scores: most schools today face a crisis in student motivation. Student motivation is critical for learning, and several researchers have found a positive and robust correlation between motivation and achievement to prove it (Urugoglu and Walberg, 1979; Vallerand and Senecal, 1993). Various studies have attempted to highlight the elements that impact on school motivation. Pintrich and Schunk (1996), among others (McCombs and Pope, 1994; Boggiano and Pittman, 1992; Waxman and Walberg, 1991; Stipeck, 1988; Bowen and Madsen, 1978), argue that teaching practices may have a tremendous impact on student motivation, and that they can affect it in many ways.

Since the beginning of the twentieth century, the concept of motivation has been studied according to a variety of perspectives (Overton, 1984; Weiner, 1992). In the last thirty years, many models, approaches and theories have inspired researchers studying motivation and education. According to Pintrich and Schunk (1996), many are the result of modern conceptions

of human beings and of the way in which they learn. In addition, three important educational schools of thought seem to guide modern theories of motivation : behaviorism, cognitivism, and humanism. For the past thirty years, most psychologists and educators have agreed that there are two main types of motivation: extrinsic motivation and intrinsic motivation. De Charms (1968) was one of the first researchers to introduce this distinction. More recently, Ryan and Deci (2000) as well as Deci and Ryan (1985, 1991) have argued that behavior can be intrinsically motivated, extrinsically motivated, or amotivated. This theoretical approach, detailed below, has generated a considerable amount of research and appears quite pertinent for the field of education.

Motivation according to Deci and Ryan (1985, 1991, 2000)

Deci and Ryan's motivation theory seems more complete than others as, on the one hand, it emphasizes the dynamic relationship between the individual and his environment and, on the other hand, it is very relevant for educational research (Vallerand, Blais, Brière and Pelletier, 1989). According to the theory of cognitive evaluation (Deci and Ryan, 1991), an individual's motivation is mainly determined by his needs for self-determination and competence. Self-determination is defined as the hypothetical degree of freedom as perceived by the individual in the choice and execution of his actions (Deci and Ryan, 1991). The authors emphasize that there also exists in individuals an important need for affiliation complementing the need for autonomy, and which is also necessary for the development of self-determined motivation. In fact, Deci and Ryan suggest that everything which is likely to influence these three factors, that is to say the feelings of self-determination, competence and affiliation, would thus have an impact on student motivation.

Feeling of Self-determination : the Determining Principle of Motivation

For to Ryan and Deci (2000), feelings of self-determination correspond to individuals' perception of the origin of their actions. If students believe that they have chosen their behavior, their feelings of self-determination will be heightened. The context in which the task is achieved is then perceived as promoting autonomy. Conversely, if students believe that their behavior is a result of external induction, their feelings of self-determination are weakened and the context in which the task was accomplished will be perceived as controlling. A stronger feeling of self-

determination will have a positive impact on the development of a student's academic motivation, whereas the opposite will have a negative impact.

Feeling of Competence : Second Determining Principle of Motivation

According to Ryan and Deci (2000), the second determining principle of motivation is the perception or feeling of competence. This element may be defined as a complex affective state, which is relatively stable, lasting and linked to an individual's representation of his aptitude, of his competence in regards to a given activity. Events which help individuals to feel competent increase their self-determined types of motivation. On the contrary, events which undermine an individuals' feelings of competence decrease their self-determined types of motivation. Many contextual factors can affect students' perception of competence and, consequently, their academic motivation *"curriculum, class structure and the teacher represent the sources of influence which may influence motivation."* (Vallerand, 1993; p. 267)

Intrinsic motivation, extrinsic motivation, and amotivation

In general, intrinsic motivation (IM) refers to the fact of doing an activity for itself, and to the pleasure and satisfaction derived from participation (Deci, 1975). Contrary to IM, extrinsic motivation (EM) pertains to a wide variety of behaviors in which the goals of an action extend beyond those inherent in the activity itself. They are behaviors which are engaged in as means to an end and not for their own sake (Deci, 1975). Originally, it was thought that EM referred to behaviors performed without self-determination and thus could only be prompted by external contingencies. However, Deci, Ryan and their colleagues (1985, 1991, 2000) have postulated a self-determination theory. This theory seems particularly relevant for the present study as it stipulates that *perceptions* of self-determination, competence and affiliation are important determinants of motivation. Also, according to Deci and Ryan, various types of EM exist, some of which are self-determined and may be performed through self-regulation. From lower to higher levels of self-determination, they are: external, introjected, identified and integrated regulation (Figure 1).

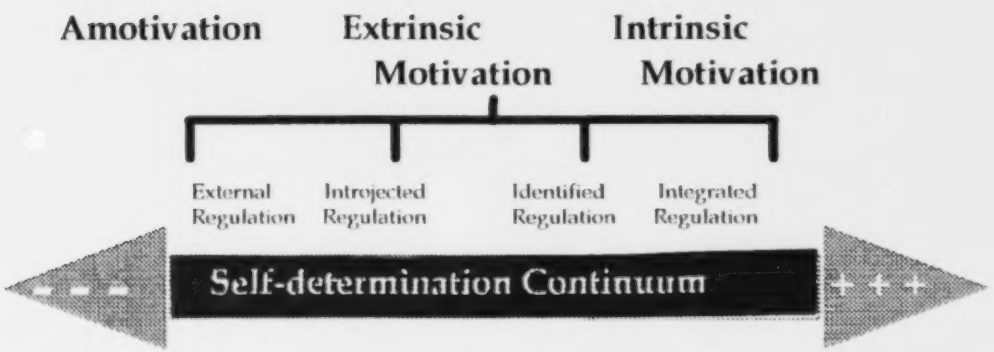

Figure 1
Representation of the Self-determination Continuum
Developed by Deci and Ryan (1985, 1991, 2000).

External regulation corresponds to EM as it generally appears in the literature. That is, behavior is regulated through external means such as rewards and constraints. With introjected regulation, the individuals begin to internalize the reasons for their actions. However, this form of internalization, while internal to the person, is not truly self-determined since it is limited to the internalization of past external contingencies (Vallerand, Blais, Brière and Pelletier, 1989). To the extent that the behavior becomes valued by the individual, and especially that it is perceived as chosen by the individual himself, then the internalization of extrinsic motives becomes regulated through identified regulation. The most self-determined form of EM is referred to as integrated regulation. According to Deci and Ryan (1991), integrated regulation occurs when the individual's action is perceived as personally valued and freely done. However, it appears that this type of motivation is difficult to assess in an educational context (Vallerand, 1993).

An increasing amount of research has been undertaken to evaluate Deci and Ryan's EM formulation. The results consistently support the basic premises of the formulation. For instance, results from confirmatory factor analyses on the motivation scales have supported the presence of three types of EM in education (Ryan and Connell, 1989; Vallerand et *al.*, 1989).

Along with intrinsic and extrinsic motivation, Deci and Ryan (1985, 1991) have posited that a third type of motivational construct is important to consider in order to fully understand human behavior. This concept is termed amotivation (AMO). Individuals are amotivated when they do not perceive a link between outcomes and their own actions. They are neither intrinsically nor

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extrinsically motivated. They are non-motivated. Amotivation can be seen in many ways as similar to learned helplessness (Abramson, Seligman and Teasdale, 1978) since amotivated individuals experience feelings of incompetence, and expectancies of uncontrollability.

Justification for and context of experimentation

In the present study, Deci and Ryan's construct has permitted us to assess student motivation in a multidimensional fashion. Their theory goes beyond the usual intrinsic/extrinsic distinction and allows for a more accurate analysis of motivation, thereby opening the door to innovative research. In the theoretical perspective of Ryan and Deci (2000), it seems that a student's academic motivation is modulated by his feelings of self-determination, competence and affiliation, and that what influences these three factors may also have an impact on motivation.

Many researchers, such as Relan (1992), have shown that using virtual learning environments can be a determining factor in promoting feelings of self-determination. Shin's works (1998) suggest that a Web course stimulates students' feelings of competence. As for Christoph, Schoenfeld and Tansky (1998), they have shown that university students registered in a virtual course (n= 164) had acquired a significantly greater feeling of self-efficiency than students registered in the same class taught the traditional way (control group, n = 231). In their conclusions, these authors also highlight the fact that students registered in the Web course (*Introduction to Educational Research*)generally felt more competent that their colleagues in the control group.

Are feelings of self-determination, competence and affiliation promoted by Web-based courses ? Is the integration of new information technology as a teaching method and as a learning environment likely to sustain the development of greater student academic motivation ? In order to answer these questions, an experimental Web-based course was designed and implemented in a Quebec (Canada) university. As previously mentioned, this was a first at the university, and the context for a study on the impact of a Web course on student academic motivation seemed favorable. We developed the Web-based *Introduction to Educational Research* course, drawing inspiration from a number of recommendations made by Boshier, Mohapi, Moulton, Qayyum, Sadownik and Wilson (1997) in their study of Web courses. This was an extensive study on the

quality of Web classes, analyzing a total of 127 courses according to an encoded grid encompassing 43 criteria.

METHOD

Though studies focusing on the impact of the teaching context on student motivation are quite helpful in pointing out which specific instructional practices could favor student motivation, in general they do not describe *how* these instructional practices are perceived nor valued by students. In fact, motivation research is a field that has been dominated by measurement, operationalized definitions, variables, hypothesis testing, and statistics. However, we believe that there is room for a research agenda that emphasizes description, and the study of students' understanding and perceptions - an approach to research Erickson (1986) has referred to as "qualitative". Though "quantitative" studies are essential to better understand student motivation, it seems obvious that a qualitative look at motivation would greatly complement these types of studies. In particular, a qualitative look at student motivation appears to be useful for new Web-based instruction or learning environments as faculty members and instructors could more easily use research findings to improve their instructional practices. It should, however, to be noted that while qualitative research is interesting for studying the *hows* and *whys* of various educational issues, it also has strong limitations, that is a lack of "generalizability" and a not-so-sufficient external validity.

It the present case, it therefore seemed most relevant to conduct a study using both quantitative and qualitative data in order to better understand the impact of a compulsory Web-based course on student-teachers motivational profile. It was felt that the results would then portray not only how this new teaching context affects student-teachers motivation, but also *how* student-teachers perceive this new Web-based instructional context. The results presented are drawn from both quantitative measures (a motivation scale was administered three times as pre, post and "post post" measurement to all students who were participating in the project) and qualitative measures (analysis of electronic mail received [$n > 5000$], semi-structured interviews conducted with student-teachers after the course [$n = 32$] and transcripts of conversations held in *chat* [synchronous] mode). It appears important to mention that, according to Krathwohl (1998) and Moss (1996), the combination of both qualitative and quantitative data generally allows for a more complete understanding of a research problem. The results that will be presented highlight

the way in which a Web-based course – eventually - promotes the students' feelings of self-determination, competence and affiliation.

Subjects

In a 15-month span, a total of 9 groups of 35-55 student-teachers (total n = 429 students: 331 females and 98 males) in their second, third or fourth year of a four-year teaching program and enrolled in a compulsory Web-based course were selected to participate. Student-teachers had a mean age of 21 years old.

Quantitative measures and analyses

An adapted version of a motivation scale developed and validated in Canada, the Motivation in Education Scale by Vallerand, Blais, Brière and Pelletier (1989), was administered three times to all students who were participating in the project. The results of the analyses conducted indicate that the internal consistency of all subscales of this scale is excellent , ranging from .73 to .91. With respect to validity, the present results are also very encouraging. A factor analysis highlights the five-factor structure ((1) Amotivation, (2) External regulation, (3) Introjected regulation, (4) Identified regulation, (5) Intrinsic motivation) and thus provides some support for the factorial validity of the scale. The first measure of motivation took place at the beginning of the first class, before the students fully aware of the learning environment. The second measure was taken after the third week of the course, when students were more familiar with the particular nature of their learning environment. The third measure was taken just after the twelfth week of the course. A serie of single sample paired t-tests procedure was used to measure significance of the difference between the means at T1 and T2, T1 and T3, as well as T2 and T3. The choice of the t-test instead of a repeated measures ANOVA was done since the control of the unequality in time laps between measurements was an important feature under our experimental conditions (Zimmerman et Zumbo, 1993). Although the timely unequal pairing of measurement results might be considered as violating some of the assumptions underlying the paired t-test, David and Gunnink (1997) highlight that its application should show some reasonable robustness.

Qualitative measures and analyses

Drawn not only from the results of the motivation tests and from interviews conducted with students, results are also a product of the analysis of electronic mail received (n > 5000) and

transcripts of conversations held in "chat" (synchronous) mode. It appears important to mention here that the qualitative analysis of such data would seem to be an increasingly promising means for dealing with qualitative data in education, especially in light of the teaching methods and the learning environment offered to the students taking "virtual" courses held on the internet (Winiecki, 1999).

The analysis of the qualitative data was conducted using an approach greatly inspired by those of L'Écuyer (1990), Sedlack and Stanley (1992) and Huberman and Miles (1991, 1994). We adopted a content-analysis type of approach. According to Sedlack and Stanley (1992) and L'Écuyer (1990), analysis of content is a "method of classification or codification of different elements of the given material, allowing the user better to know its characteristics and signification" (L'Écuyer 1990; p.9) As can be seen in Table 1, this author proposes a six-step model for the analysis of content, and it is to this table in particular that we referred in our analysis of the data collected.

Table 1: General Model of the Different Steps in Content Analysis (adapted from L'Écuyer, 1990)

Step	*Characteristics*
I	Reading of the data collected (transcripts of interviews, e-mails received, transcripts of conversations held in CHAT mode)
II	Definition of classification categories for data collected
III	Categorization of the data collected or final classification of the data collected (according to the three determinants of motivation)
IV	Quantification and statistical data processing (not presented in this text)
V	Scientific description of the case or cases under investigation (course developed at UQAH)
VI	Interpretation of the results outlined in Step V (in this step, L'Écuyer (1990: 23) speaks of "discovering the hidden meaning, the latent content" of the data collected)

PRESENTATION AND ANALYSIS OF RESULTS

QUANTITATIVE MEASURES

As shown in Table 1 and Figure 2, the students' average score for self-determined types of motivation on the second motivation test, at a time when they were completely aware of the organization of the Web-based course, is significantly lower than the average score obtained in

the first motivation test ($p < 0{,}0001$). As well, the students' average score for non self-determined types of motivation is significantly higher than the one on the first motivation test.

Table 1: Average score of students' motivation Change between Week 4 and Week 1 (n = 429)

	Non or little self-determined types of motivation			Self-determined types of motivation	
	Amotivation	**(EM) External Regulation**	**(EM) Introjected Regulation**	**(EM) Identified Regulation**	**Intrinsic Motivation**
Motivation change (Week 4 – Week 1)	+ 0.51	+ 0.60	+ 0.36	- 1.56	-1.58
Significance of gain (betweenWeek 1 and 4)	*t = 5.11 p < 0,0001*	*t =6.87 p < 0,0001*	*t =8.01 p < 0,0001*	*t = 15.76 p < 0,0001*	*t = 20.58 p < 0,0001*

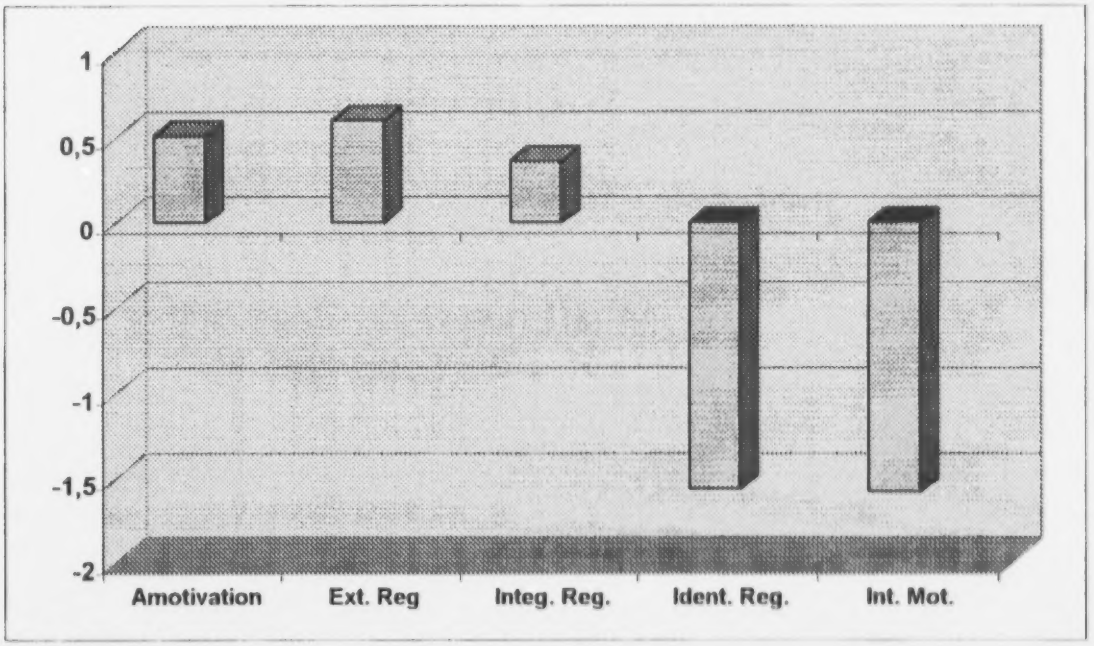

Figure 2

Average score of students' motivation Change between Week 4 and Week 1 (n = 429)

As shown in Table 2 and Figure 3, the average score obtained by the students in the third motivation test, administered just after the twelfth week of the course, highlights a significant increase in self-determined types of motivation, when compared to the average score on both test

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1 (week 1) and test 2 (week 3-4). As well, the results highlight a significant decrease in non self-determined types of motivation, also when compared to the average score on tests 1 and 2.

Table 2 : Average score of students' motivational profile for week 1, 4 and 13

	Non or little self-determined types of motivation			Self-determined types of motivation	
	Amotivation	**(EM) External Regulation**	**(EM) Introjected Regulation**	**(EM) Identified Regulation**	**Intrinsic Motivation**
Week 1	1.41	2.11	3.04	5.61	5.30
Week 4	1.92	2.71	3.40	4.05	3.72
Week 13	1.14	1.94	2.77	5.94	6.11
Sig. of gain (Week 1 vs 4)	*t = 5.11 p < 0,0001*	*t =6.87 p < 0,0001*	*t =8.01 p < 0,0001*	*t = 15.76 p < 0,0001*	*t = 20.58 p < 0,0001*
Sig. of gain (Week 1 vs 13)	*t=6,28 p < 0,0001*	*t=4,77 p < 0,001*	*t =4.99 p < 0,0001*	*t= 7,08 p < 0,0001*	*t= 13.99 p < 0,0001*
Sig. of gain (Week 4 vs 13)	*t= 15.57 p < 0,0001*	*t=17.02 p < 0,0001*	*t=15.42 p < 0,0001*	*t= 21.90 p < 0,0001*	*t= 29.11 p < 0,0001*

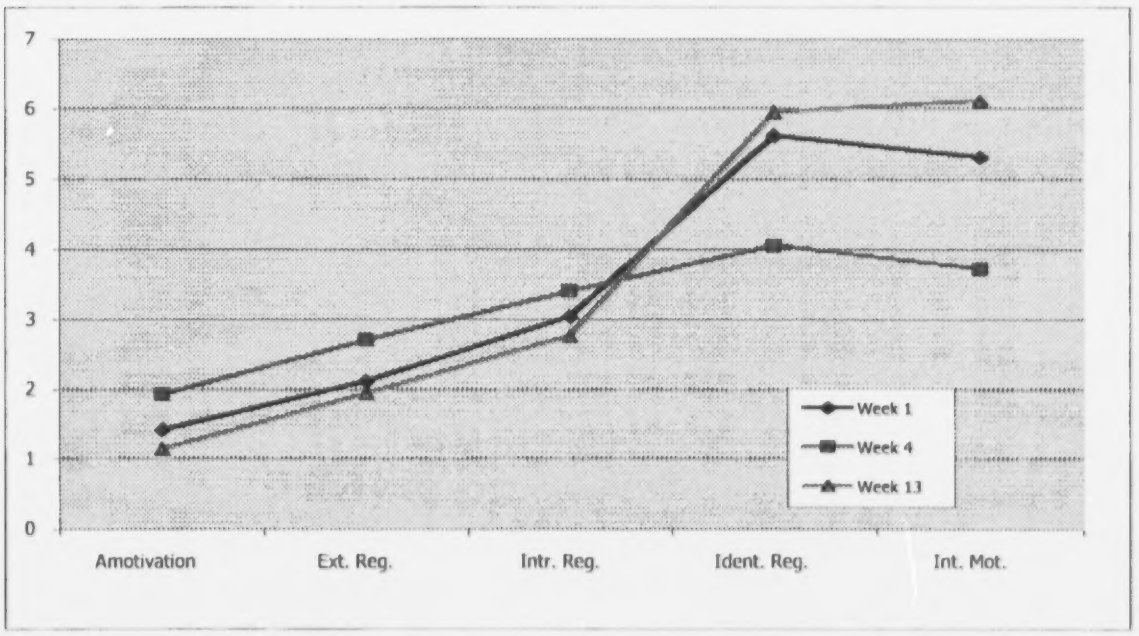

Figure 3

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Representation of Students' Average Score for their Motivational Profile in Week 1, 4 and 13.

The students' results on the motivation tests seem to highlight the resistance felt and hardships encountered at the beginning of the implementation of the course held on the Web. Nonetheless, these results also show that the motivation of students at the end of the course was much higher than when the course first began or in the second week when a certain effort was required simply to get adjusted to this new kind of "Web-based university teaching".

QUALITATIVE MEASURES

The results of the students in the three motivation tests were corroborated by the qualitative analyses. The analysis of the interviews conducted with the students, the transcripts of conversations held in CHAT mode and the e-mails received also highlight the way in which a Web-based course promotes the students' feelings of self-determination, competence and affiliation. It is therefore in reference to these three determinants that the results are presented.

How Does the Course Promote Self-determination ?

Analysis of the data from this study demonstrates the many ways in which the Web-based course impacted this determinant of student motivation. Among other things, such a learning environment seems to have allowed students to :

- Work at their own pace ;
- Structure and manage their knowledge acquisition ;
- Choose their workplace ;
- Actively participate in their learning by making their own choices.

A Permanently Accessible Classroom

The comment which is most often found in the data is that the classroom (the class Web site) is accessible at all times and from anywhere. It is among the elements which seem to have been most appreciated by students. Many underscore the advantage of such accessibility and indicate that the flexibility of the learning context helped them regain the desire to attend university.

'' A class like this has allowed me to appreciate university anew. I work part-time [...], but I've always given priority to my studies [...] This class gave me a lot of flexibility'' (interview excerpt, student)

'' Sir [...] I'm writing to tell you how much I appreciate the Internet class. Having access to the classroom 24 hours a day is a great advantage for me. I find it really modern and it really motivates me to apply myself in my work [...]'' (student e-mail excerpt)

'' For me, the greatest advantage of the Internet class is that I can do my assignments when and where I want [...] I'm no longer constrained to the class schedule or the classroom. If I feel like going to class on the weekend, I go [...] '' (interview excerpt, student)

Also, if many students living in outlying regions, this class has allowed for greater autonomy, which has in turn promoted an increase in the time spent on study. Students no longer have to travel to get to class as the latter is accessible from any location.

'' This class also allowed me to give more time to my studies. Driving from Papineauville to Hull [about 75 km] takes up two hours a day. With this introduction to research class, I could be at school and at home at once. '' (interview excerpt; student)

'' [...] usually, I live with my aunt during the week and I go back home to Mont-Laurier on the weekend [about 300km from the university] . When we do our practicum, mine is in Mont-Laurier, so it's more complicated because I travel a lot more between Hull and Mont-Laurier . With this class, I don't have to be in Hull or Mont-Laurier. No matter where I am, I can do my homework and follow the class. It's very handy for me, it lets me be independent and I waste less time [...] That way, I spend more time on schoolwork. '' (interview excerpt; student)

Conversation Excerpt in Chat mode (synchronous mode ; The students' names, usually posted in Chat conversations, have been removed in order to preserve anonymity.)

Student 1 : [...] *It's actually the first time I can attend class from home in Montreal. It's fabulous.*

Professor : *It's one of the advantages of a virtual course. Class can happen anywhere.*
Student 2 : *Lucky you. I'm still at University. I had other work to [...]*
Student 3 : *It's true that it's convenient. No need to worry about taking the bus, going somewhere else. It leaves more time to do the work.*
Professor : *Exactly... the purpose of this meeting is to [...]*

Learning at One's Pace : Reinforcing Feelings of Self-determination

This course seems to contribute to the development of students' feelings of self-determination, as they are neither hurried by faster students nor held back by slower students. They can thus progress at their own rate, independently, within exercises and activities which promote learning. This fact is particularly important when this type of course is compared with traditional courses given in classrooms. Thus, for example, students who are ahead can finish the course within a few days, while others can finish it more slowly, according to their ability to meet the objectives. The individualized pace afforded by a virtual course appears to be an important motivational factor and seems to be perceived as an advantage by all the students.

'' *Hello, it's the end of the class and you wanted some comments [...]. Here are mine [...] In general, I really enjoyed the course. There was a lot of work, that's true. But, for the first time in a while, I was really able to learn at my own pace. This was the most positive aspect of the class for me. In regular classes, I drift off a lot. Sometimes, it's because I don't understand and the prof goes too fast, other times it's because I'm bored and the prof asks too many easy questions. With an Internet course, I could go at my own pace, and for me, this was a great source of motivation [...].* ''(Student e-mail excerpt)

Conversation Excerpt in Chat mode

Student 4 : *We can do the work when we want ?*
Professor : *Yes, as long as you hand it in before the deadline.*
Student 4 : *Does that mean I can finish the class in 4 weeks if I want ?*
Professor : *If you meet all the course requirements, yes.*

Student 5 : *That's good. Has anyone ever finished one of your classes in one week ?*

Professor : *This is the first Web class at the UQAH, so it's hard to answer.*

Student 5 : *Well, that motivates me to try it with my team. We'll send you our work...*

'' The idea of being able to go at your own pace, I think it's great. In the past, I've dropped out of university classes because the prof went too fast. At the beginning of each course, the very first class, that's what I'm afraid of. If it's going too fast and I don't know anyone, I immediately feel like dropping out. With the Internet course, I worked a lot, but I never felt hurried. I could take my time [...] the time I need to do the work [...]'' (interview excerpt; student)

Self-Management of Learning and Knowledge : a Pedagogical Environment that Opens the Door to Autonomy and Active Participation

The design of the virtual course is centered on the development of students' feelings of self-determination (Deci and Ryan, 1991), from the standpoint of both deadlines and personal investments required from students. Indeed, once on the course site, the student plans his learning process by using the class calendar. Globally, this calendar allows him to fix goals and deadlines of their own while adjusting the pace at which he works. Conversely, students enrolled in a traditional course - in a classroom - have the same constraints and deadlines as their colleagues imposed upon them, leaving little room for autonomy.

However, the nature of the course does not promote autonomy unilaterally : the learning method proposed to students requires self-determination and self-management, while emphasizing the development of the student's sense of competence. Moreover, for a few students, the autonomy granted to them at the beginning of the course seemed difficult to manage, particularly during the first few weeks when they thought that in the absence of a strict framework, regular class schedule and actual classroom where one must be present weekly, that *'' the work can be done at the last minute''* (student). Some students then stated that they were not *'' used to learning by themselves ''* (student) or that they may not have been ready to work in a class where *'' you have to be the one to discipline a student (me) who doesn't work [...] ''* .

However, even if many students weren't used to managing their own knowledge acquisition, many indicated that this was one of the course's positive aspects. Others even stated that having more responsibility pushed them to work harder and participate actively and that it allowed them *''to learn how to learn''* (student).

'' [...]at the beginning, I wasn't used to disciplining myself. But after a few weeks, I thought it was really good. It was the first time in a long while that I felt responsible for what I was learning.'' (interview excerpt; student)

'' [...] I enjoy the course structure. Besides learning educational research methods and how to use new information technology (and this wasn't easy, believe me), we learn a work method or strategy. While at first I found the practical exercises really hard (I wrote you a note three weeks ago), well, they're not that complicated. It's just that usually, I don't really know how to say this, we have a sense of being more rigidly followed and directed. Not that we're not in the Internet course, it's just that we have more autonomy in this class. In other classes, for the assignments, the answers are really set (except for teaching projects). Here, it's like were being pushed to learn by ourselves. At first, it's not easy, but in the end you like it (and I'm not just speaking for myself). Finally, I think that it's very good [...]'' (student e-mail excerpt)

'' [...] what was interesting in this class was that we could work when we wanted and at our own pace [...] It's as if we had a lot more freedom. At first, I thought that I wouldn't have to work and that this would be an easy class. However, when our team met, we decided to finish the whole course as quickly as possible [...] but to do it well too. And then, we were surprised to see how hard we worked and that sometimes, we even did more than what was asked, as in the gathering of data [...] and we practically finished the whole course in less than two weeks, except for the research project [...]. Having more autonomy was better for us. We worked really hard and we enjoyed it.'' (interview excerpt, student)

How Does the Course Promote Feelings of Competence ?

The Web-based course was conceived according to two of the Quebec (Canada) Ministry of Education's (1997) priorities, which were described in its latest plan of action : *A New Direction*

for Success : Ministerial Plan of Action for the Reform of the Education System. These priorities are as follows : the development of intellectual abilities and the acquisition of methodological skills. This virtual course advocates a strategic approach centered on knowledge acquisition through the elaboration and completion of an actual research project in a school setting. We chose this approach as it is most likely to promote the acquisition of theoretical and methodological knowledge, as well as to favor the acquisition of a rigorous scientific epistemology. These are crucial for the student who wishes to bring his scientific research project to fruition, this project being the culmination, the result and product of his work and learning.

In order to execute their research project in a school setting, students acquire the basic methodology which allows them to continue to learn and they experience the motivation to bring it to completion. Through this experience, students significantly integrate methodological skills which will prove indispensable in their professional practice and which will contribute to their feelings of competence.

In addition to getting to know the school setting where the research was executed, the completion of the research project gives the students practical and methodological skills, as well as a deep valorization of his approach. The ensuing motivation and great personal satisfaction felt can only promote, beyond the development of scientific rigor and an appreciation for active research and continuing education, students' feelings of competence and self-determination.

The collected data also highlights the role of project-centered approaches (one used in the Web-based course) in the promotion of the students' feelings of competence. Indeed, many students appreciate that the way in which the course and its activities were organized facilitated the learning process, and that the approach takes learners' previous knowledge into consideration. As well, for many, the course demystified educational research and made it more accessible to future teachers.

" [...] what I liked about the course was that I started from what I already knew. When I read the objectives and the summary, I'd tell myself 'I know this, I don't know that'. That way, I knew

what to expect [...]. It was easier to learn [...]. It was also easier to be interested [...]. But what I liked best, I think, was that I got to do a small-scale research at a school. I had the feeling that the principal from whom I had asked for authorization no longer saw me as just an intern [...]. Also, the principal wants me to present the results at the next teacher's meeting. [...] I'm giving teachers a presentation and haven't even finished my B.Ed. [...]. '' (interview excerpt, student)

How Does the Course Promote Feelings of Affiliation ?

It might be easy to think that a virtually-taught, on-line course is impersonal and that students will feel removed and distanced from their virtual peers in the class. However, the opposite was true. Students in the Web class always have opportunities to communicate with peers, the technical support team and the professor. While the student develops personal autonomy for his work and research methods, he is not isolated as he can also count on feedback from his peers. Indeed, this course was designed to promote an optimal exchange of ideas and information, the confrontation of opinions and viewpoints and the creation of a support system, something which is not always possible in traditional classes which are, for the most part, lectures. Through a wide array of means of communication (phone, electronic, paper, and so on), the availability of resource persons to answer students' questions is, in a way, increased.

The qualitative analyses just presented seem to highlight the way in which a distance education course given on the Web eventually assists in the development of the students' motivation to learn. Through such a course, the students and the professor were required to think differently of their relation with time and space and they were challenged to make this new approach to teaching and learning their own.

CONCLUSION

While the analysis of the results reveal the positive impact of a course given on the Web on the students' motivation to learn, the analyses conducted also unveil the fact that all students may not be ready to handle such autonomy or self-determination, and that the gap between the university classroom and the virtual classroom is substantial, often difficult to bridge. This gap is

particularly evident when we observe the significant decrease in the students' motivation after only four weeks of the course.

However, despite the obstacles students faced, analysis of the transcribed *chat* conversations and of the e-mails received exposes the advantage of integrating ICTs in teacher education programs. The pilot-project experienced in Quebec has enabled us to note the change which occurs among future teachers when they are confronted with ICTs in their practical training: a change in terms of their motivation to learn using ICTs, as well as in terms of their attitude towards learning to use ICTs, learning with ICTs and about ICTs. The experience they underwent as learners, when they were faced in a compulsory situation with the integration of technologies in the context of a university course (*Introduction to Eductional Research*), is likely to shed a positive light on the integration of ICTs in general, and may, quite possibly, create favorable conditions and incentive for further integration of ICTs in their own teaching, either during a practicum or during their professional teaching endeavours. Technologies are then perceived as learning tools with which the learners become more autonomous, more analytical in the face of dilemmas; they must find credible and relevant sources of information in order to answer their own questions. Other advantages have also been identified:

- elimination of physical limits traditionally imposed by the classroom, leading to new, more open access to learning;
- greater access to information and knowledge;
- increased motivation to learn for future teachers;
- better learning, which in turn is more likely to sustain the cognitive development of learners;
- more effective and custom-made teaching;
- more efficient teaching management (for educators)
- improved more frequent communication (among educators and learners, among the learners themselves, but also among the educators);
- enhanced development of critical thought, thanks to increased communication;
- greater autonomy for future teachers.

Student teachers confronted with the integration of technologies in their learning were called upon to view differently their relation to time and space; they had to acquire a new way of learning which seemingly provided them with increased motivation. However, integrating new information technologies in university pedagogy represents an enormous challenge and the disturbances that will inevitably follow must be met with both enthusiasm and wariness. The pilot-projects implemented in Quebec have allowed us to ascertain that there are substantial advantages in integrating ICTs in teacher education programs, although there remains a large and considerable gap between the "real" university classroom and the virtual, technology-enhanced university classroom. As noted by the *Conseil de la science et de la technologie* (1998), sciences and technology are the engines of innovation and are at the heart of the economic growth of modern societies: they are destined to increasingly gain in stature at the core of any citizen's basic training.

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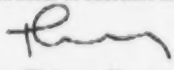
Signature:  Position: Professor

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Address: Telephone No: (514)-343-2457

Faculté des sciences de l'éducation
Université de Montréal
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